Effects of carbon dioxide on the searching behaviour of the root-feeding clover weevil *Sitona lepidus* (Coleoptera: Curculionidae)

Bulletin of Entomological Research, Volume 96, Issue 4

DOI: 10.1079/BER2006436

Published online: 09 March 2007, pp. 361-366

Print publication: August 2006

Abstract

The respiratory emission of CO_2 from roots is frequently proposed as an attractant that allows soil-dwelling insects to locate host plant roots, but this role has recently become less certain. CO_2 is emitted from many sources other than roots, so does not necessarily indicate the presence of host plants, and because of the high density of roots in the upper soil layers, spatial gradients may not always be perceptible by soil-dwelling insects. The role of CO_2 in host location was investigated using the clover root weevil *Sitona lepidus* Gyllenhall and its host plant white clover (*Trifolium repens* L.) as a model system. Rhizochamber experiments showed that CO_2 concentrations were approximately 1000 ppm around the roots of white clover, but significantly decreased with increasing distance from roots. In behavioural experiments, no evidence was found for any attraction by *S. lepidus* larvae to point emissions of CO_2, regardless of emission rates. Fewer than 15% of larvae were attracted to point emissions of CO_2, compared with a control response of 17%. However, fractal analysis of movement paths in constant CO_2 concentrations demonstrated that searching by *S. lepidus* larvae significantly intensified when they experienced CO_2 concentrations similar to those found around the roots of white clover (i.e. 1000 ppm). It is suggested that respiratory emissions of CO_2 may act as a 'search trigger' for *S. lepidus*, whereby it induces larvae to search a smaller area more intensively, in order to detect location cues that are more specific to their host plant.